CREATOR

VOLUME 21 NUMBER 1

A BIRD'S TALE

Look at the birds of the air (Matthew 6:26a).

A sincere study of birds will immerse you into the incomparable glory of our great Creator and Savior, Jesus Christ (Psalm 145:5). Our precious Lord Jesus, who made all things for His Father's glory and His own pleasure, can also encourage us with birds when we're feeling anxious or down, *if we put our hope in Him*. "He gives strength to the weary, and to him who lacks might He increases power . . . those who wait for the Lord will gain new strength; they will mount up with wings like eagles" (Isaiah 40:29, 31). And did not Jesus say, "Look at the birds of the air . . . your heavenly Father feeds them. Are you not worth much more than they?" (Matt. 6:26)? An earnest study of birds, a science known as *ornithology,*[1] reveals much about God's character and His love.

Join us now in humbly looking to the heavens and observing these marvels of aerodynamic design. Surely your heart will be strengthened by such an exercise, and hopefully you will come to know our wonderful Creator better (Hosea 6:3), the One who cares for the lowly (Isaiah 57:15) and gave Himself up for those who love Him (Ephesians 5:25).

1 The English word ornithology comes from the ancient Greek ὄρνις or *ornis* ("bird") + λόγος *logos* ("rationale" or "explanation").

"BIRDS OF A FEATHER"

Birds communicate a very simple message through Christ's masterful design and construction: "The Lord made us to fly!" Almost everything about avian[2] anatomy and physiology promotes freedom of flight. In this way, the architecture of birds is radically different from other vertebrates (mammals, reptiles, amphibians, and fish), as we shall see. And nothing proclaims this fact more than feathers.

No other group of creatures on Earth, past or present, has feathers—they are unique to birds.[3] In keeping with the infinite wisdom of our Creator God, and His gentle, sweet care for all His creatures (Psalm 145:9), Jesus designed feathers with at least four functions in mind:

Northern cardinal

2 "Avian" is an adjective referring to birds.

3 Many paleontologists insist that some dinosaurs had feathers, but there is no good evidence for this claim.

THE BIRDS JESUS MADE

Our Lord Jesus made almost 10,000 kinds of birds. And they live in almost every environment imaginable. On these pages, we have showcased just a few.

LAKE BIRDS

God created . . . every winged bird after its kind; and God saw that it was good (Genesis 1:21).

Flamingo

The color of the flamingo's feathers comes from carotenoids in the food they eat (tiny shrimp and algae). Carotenoids are the pigments that make egg yolks yellow and carrots orange. They are also the chemicals that Jesus uses to produce the beautiful colors of fall leaves.

Andean condor (*Vultur gryphus*)

MOUNTAIN BIRDS

MARSH BIRDS

Red-winged blackbird (*Agelaius phoeniceus*)

The male red-winged blackbird has a characteristic "oak-a-ree" call. Flocks in winter can number over a million!

DESERT BIRDS

Some birds, like the great horned owl, live in many different habitats.

Gila woodpecker (*Melanerpes uropygialis*)

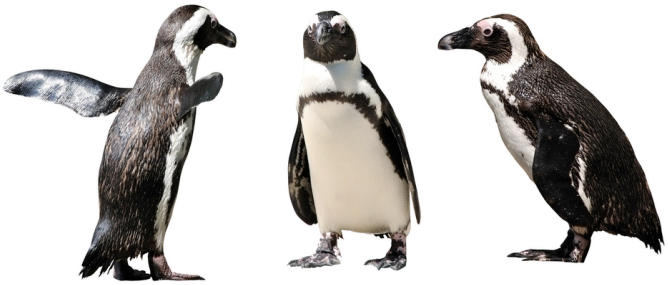
Great horned owl (*Bubo virginianus*)

CLIFF-DWELLING BIRDS

The puffin dives into coastal waters to catch fish. God gave it the ability to hold several fish in its beak at the same time.

Atlantic puffin (*Fratercula arctica*)

Humboldt penguins are named after the explorer Alexander von Humboldt.



Humboldt penguins (*Spheniscus humboldti*)

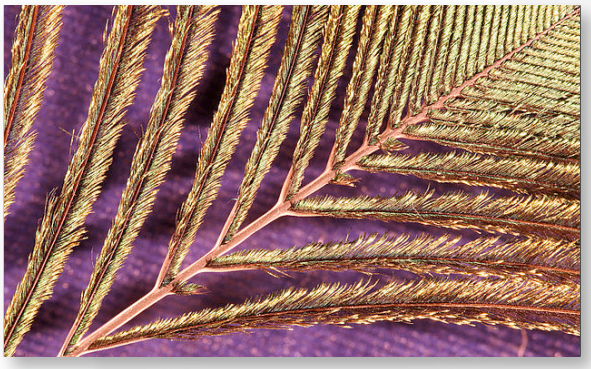
POLAR BIRDS

1) Feathers are crucial for flight.
2) They insulate against extremes of temperature—hot and cold.
3) They provide waterproofing.
4) The Lord uses feathers to decorate birds with an amazing variety of patterns and beautiful colors.

Folks who study birds in detail can name at least nine kinds of feathers, but we will focus on three main types:

1) Flight feathers (essential for controlled flying)
2) Contour feathers (provide streamlining necessary for flight)
3) Downy feathers (help keep birds warm)

Feathers are one of the most complex structures in the animal kingdom. It has been estimated that a single flight feather is composed of a million or more parts! Now consider that Jesus gave each of the nearly 10,000 species He



Closeup of a peacock feather

created a unique feather design, and we are then faced with a complexity of structure that is beyond imagination (Psalm 145:3).

The number of feathers each bird possesses varies from species to species and with the time of year. A hummingbird may own as few as 940 feathers, while a swan has as many as 25,000. Birds that live in colder climates or those that spend a great deal of time in water usually possess a larger number of feathers than birds that do not.

It's extremely important that birds keep their intricate and delicate feathers clean. If feathers become soiled, they tend to stick to one another, making them less efficient in flight. Dirty feathers also lose their ability to insulate and waterproof, and can become harbingers of harmful parasites. As such, it is common to see birds routinely cleaning their plumage and rubbing oil over each feather, an activity known as preening.[4]

Birds can also be found bathing themselves in water or dust in an effort to keep clean. And more than 200 types of birds (e.g. wild turkeys, ravens) engage in a rather unusual activity called *anting*. While lying on the ground near an ant colony, a bird allows these insects to crawl over them and between their feathers. As they do, the ants release formic acid from their stingers; it is thought that this acid helps kill parasites, such as fleas and lice. Clean feathers are so important to a bird's survival.

MUSCLES & BONES

Unlike other vertebrates—such as fish—birds possess a fairly rigid internal skeleton. This rigidity of frame is absolutely necessary while flying due to the tremendous forces that the powerful flight muscles put upon a bird's skeleton.

Bones in the avian wing are usually hollow, to reduce weight,[5] but Christ strengthens them from within using "struts." This divine design has been copied by aeronautical engineers and applied to the construction of airplane wings.

The flight muscles of a bird are found in its chest and correspond to the breast meat of a carved chicken or turkey. God divided these muscles into two groups: one set provides the powerful downstroke during flight, the other lifts the wings back up (the upstroke). A full 30% of a bird's body weight may come from its flight muscles.

4 Most birds have a preen gland at the base of their tail from which they obtain oil.
5 Larger birds, like eagles, possess hollow bones throughout their bodies to reduce weight, while diving birds have few or no hollow bones, thus making them less buoyant and allowing them to go deep underwater.

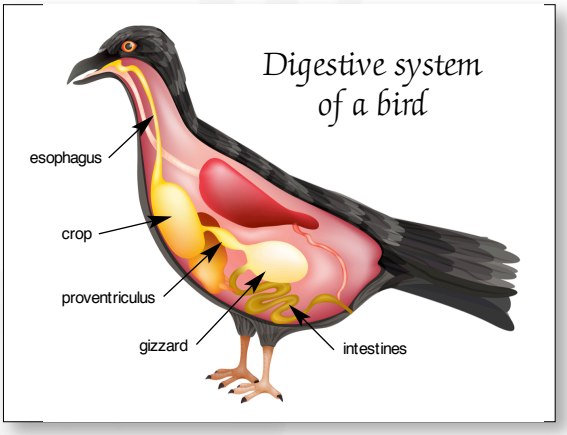
Christ Jesus also supplied birds with a complex set of tiny wing muscles that allow them fine control over their wings and flight feathers. Since it is the breast muscles that provide power for flying, these wing muscles do not need to be large (as evidenced by the paucity of meat in a cooked chicken wing, for instance). These fine muscles adjust the shape and position of the wings, essential for ever-changing wind and weather conditions. This is something that fixed-wing aircraft cannot do, revealing the superiority of Christ's marvelous design. It has been said that "the avian wing is a marvel of . . . engineering."[6] We agree!

DIGESTION

At first glance, we might think that food and digestion are no more important for birds than other animals, but nothing could be further from the truth. The act of flying burns a tremendous number of calories—far more than running, climbing, swimming or digging. Birds must have a ready supply of energy, thus our Lord Jesus gifted them with an extremely efficient digestive system.

The digestive tract of a typical bird is divided into the *esophagus*, *crop* (a widening in the esophagus where food can be temporarily stored),[7] *proventriculus* (which functions much like our stomach), *gizzard*, and *intestines*. The gizzard is considered a bird's "second stomach." It has a thick muscular wall with a coarse inner lining that feels like sandpaper. The powerful gizzard is to a bird what our teeth are to us—it "chews" and grinds things like seeds, and even bones. A turkey's gizzard, for instance, is so strong that it can crush whole walnuts! Some birds aid this action by swallowing small stones; sand and pebbles assist the gizzard in grinding food.

6 Proctor & Lynch, *Manual of Ornithology*, (Yale University Press: New Haven, 1993), p. 158.
7 Many birds (penguins, pelicans, and pigeons to name just a few) feed their young with food stored in their crop.



Before a bird can swallow something to be digested, it must first get it into its mouth. Jesus designed an amazing number of beaks, providing each bird species a tool uniquely fitted to its environment and diet. He made beaks to . . . crack hard nuts, tear apart flesh, catch insects in midair, obtain nectar from deep inside flowers, sift through mud in search of clams, strain algae, or scoop fish out of the water.

Have you ever wondered just how powerful a bird's beak might be? An olive pit, for instance, requires a force of 110–160 pounds (47–72 kg) to crack it, yet a 2 ounce (56 gm) finch can easily break it open. And the hawfinch (*Coccothraustes coccothraustes*) can open something as hard as a cherry pit.

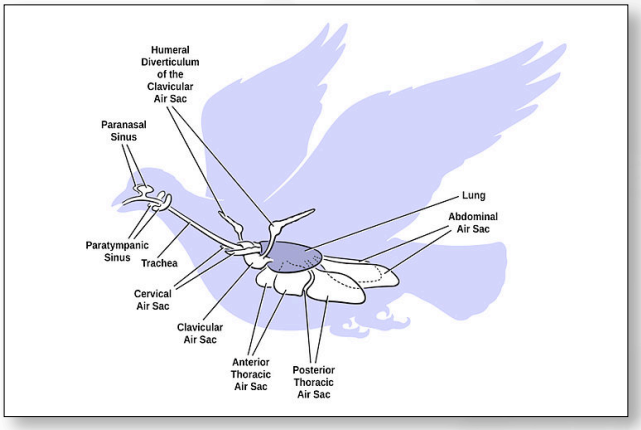
As with most groups of animals, birds may be carnivores (meat eaters, like eagles), herbivores (plant/seed eaters, like pigeons), or omnivores (e.g. song birds, which eat both insects and seeds). In His sovereignty, God also created many birds with rather specialized diets:

- toucans and parrots—mostly fruit
- snail kite—only freshwater snails
- secretary bird—snakes
- palmnut vulture—fruit from the oil palm
- African bat hawk—bats
- limpkin—large snails found in marshes
- hoatzin (WAT - sin)—leaves from bushes
- hummingbirds—nectar
- African oxpecker—ticks and mites off the backs of large mammals

HEART & LUNGS

Flying requires that a large amount of oxygen be delivered rapidly to all the tissues of a bird's body, especially the flight muscles. In order to meet this demand, our Creator Jesus provided the bird with a cardiovascular system second to none. Birds have the largest heart—relative to body size—of any vertebrate. And the rate at which the avian heart pumps blood is extremely high. Songbirds typically possess a heart rate of 350–450 beats per minute (bpm).[8] This large, powerful, and rapidly beating heart produces a "raging torrent" of blood that pulses throughout a bird's blood vessels.

In order to supply oxygen-rich blood for the heart to pump, Christ also created a unique respiratory system. Jesus placed within each bird numerous air sacs that communicate with its lungs. These air sacs do not absorb oxygen as such, but make extra air available to a bird in times of need. When a bird inhales, oddly enough, air *leaves* its lungs. The reason for this



The numerous air sacs of a pigeon

is that inhaled air is taken directly into its air sacs. It is only when the bird *exhales* that air enters the lungs from the air sacs. As you might expect, the dynamics of air flow in the avian respiratory system are very complex.

8 Our heart rate is 60–100 bpm at rest, somewhat higher in children.

One of the effects of maintaining such a "fiery" metabolism is that most birds run a body temperature of 106°– 114° F (41°– 45° C). Our own body temperature is normally 98.6° F (37° C). If we ran a temperature as high as a bird's, we would suffer brain damage.[9]

Jesus clearly designed the avian heart and lungs to withstand tremendous stress, stress which would easily send a healthy person into cardiac failure. God made them this way so that He can then lead them to do phenomenal things no other creature can, thus displaying His glory. Bar-headed geese, for instance, routinely fly over Mount Everest at an altitude that would quickly send us into unconsciousness. The avian world altitude record, however, belongs to the Rüppells' Griffon (*Gyps rueppellii*)—36,000 feet (11 km), almost seven miles.

HUMMINGBIRDS

It is necessary to pause in our general discussion of birds and apply what we've learned to a singularly remarkable flier—the hummingbird. It is in this special creature that our Lord's avian design is fully "put to the test" and His glory magnified.

Hummingbirds live on the ragged edge of what is physically possible for a warm-blooded animal.[10] Their metabolism is so intense that they will starve within hours if food is withheld. These birds must eat every five to ten minutes to survive (much like teenagers!).

One of the reasons why hummingbirds burn so much energy is that hovering flight is the most difficult, complex, and strenuous activity a bird can perform. (Few birds other than hummingbirds have the ability to hover.) Not only do hummingbirds hover in midair while extracting nectar from flowers, but they can also fly backwards, and are the only bird that can do so.

9 Why don't birds suffer brain damage? We simply don't know.
10 Proctor & Lynch, *Manual of Ornithology,* (Yale University Press: New Haven, 1993), p. 188.

All during this activity, a hummingbird's heart rate can reach 1,300 bpm (22 beats *each second*). In contrast, a person possessing a heart rate of 250 bpm will rapidly faint and, if this rate is sustained for any length of time, might even die.

In order to conserve energy at night when they cannot feed, Christ lowers a hummingbird's body temperature when they sleep, from a daytime high of around 107° F (42° C) to 70° F (21° C) or so. This drastic change in body temperature would, again, kill a person.

It's curious that these tiny metabolic dynamos—so utterly dependent upon a continuous supply of food—migrate long distances in fall to avoid cold weather. Why don't they just stay in the tropics year round, increasing their chances for survival? Hummingbirds don't necessarily need to make the long, arduous, and dangerous journey north to the United States and Canada, because there is plenty of nectar to be had in tropical rainforests. It seems that Christ sends them north as avian "missionaries," risking their own lives to spread the fame of His name and glory as revealed in their remarkable lives!

MIGRATION

Many birds the world over migrate when weather changes or food supplies diminish. Some birds migrate because they are not willing or able to change their diet. True insectivores are birds that eat only insects, and they will travel long distances to find them. (There are other species of birds that consume insects in summer, but switch to eating seeds in winter.)

The time of the year that each species of bird migrates varies somewhat, as does the location to which they fly. Migrating birds in the United States and Canada, such as warblers, usually go as far south as Central and South America in autumn. In Europe, warblers often migrate to Africa. Likewise, there are bird species that summer in northern Canada and Greenland which travel over the open water of the Atlantic Ocean to Spain in the fall, a perilous trip of 1,850 miles (3,000 km).

Some migrating birds fly day and night nonstop until they reach their destinations. Others migrate only during the day, or only at night.

But the perennial champion of all migrating animals is the *Arctic tern*. It summers within the Arctic Circle, then flies 9,000 miles (14,500 km)

Arctic tern (*Sterna paradisaea*)

to Antarctica to spend a second summer there. It is most astounding to realize that the Arctic tern makes this incredible journey *twice a year*.

SONGS & CALLS

No study of birds would be complete without investigating their remarkable calls and songs. Though most scientists have convinced themselves that birds primarily sing to attract a mate, there's little evidence for this conclusion. If we, rather, look to the Lord and His Word for an explanation (Psalm 96:11-13; Psalm 104:10-13), it then becomes obvious that the vast majority of bird songs are "hymns" unto our Creator. That these praises of God attract the opposite sex should be no surprise.

RIVER BIRDS

American dipper
(*Cinclus mexicanus*)

As strange as it might seem, the American dipper (also known as a water ouzel) doesn't just feed along a river, but in it! Jesus made them capable of submerging themselves underwater while walking along a stream bottom, against a current, in order to search for food.

Blue jays are omnivores and will consume just about anything edible.

Blue jay
(*Cyanocitta cristata*)

TEMPERATE BIRDS

Zebra finch
(*Taeniopygia guttata*)

"Who prepares for the raven its nourishment when its young cry to God and wander about without food?" (Job 38:41).

American avocet
(*Recurvirostra americana*)

SHORE BIRDS

The avocet eats crustaceans and aquatic insects.

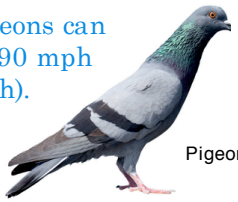
Macaws eat nuts and seeds. Breeding pairs stay together for life.

Green-winged macaw
(*Ara chloropterus*)

Hummingbirds feed on nectar.

TROPICAL BIRDS

Some pigeons can fly up to 90 mph (140 km/h).



Pigeon

URBAN BIRDS

Ostrich
(*Struthio camelus*)

GRASSLAND BIRDS

Christ provided most birds with four toes on each foot; the ostrich has just two, allowing it to run up to 45 mph (70 km/h).

Northern royal albatross
(*Diomedea sanfordi*)

The albatross has the widest wingspan of all birds—up to 11 ft. 6 in. (3.5 meters).

OCEAN BIRDS

Pages 2 and 7 form a "Bird Poster" you can put on your wall.

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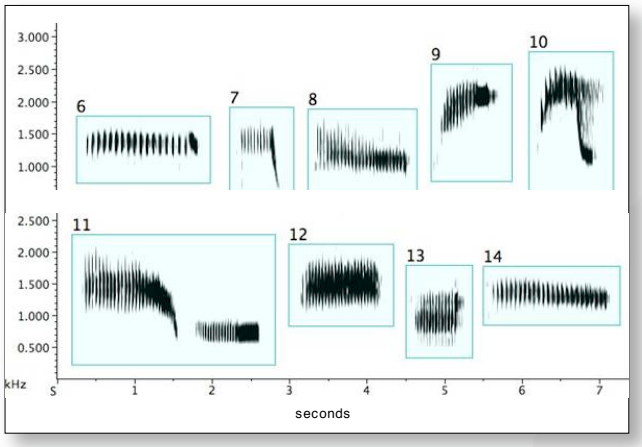
Bird songs tend to be concentrated in the spring and, to a lesser degree, early autumn, early in the morning, and when weather is fair. In temperate climates it is almost always the male bird that sings; in the tropics, both male and female birds offer praise to their Creator.



Sonograms showing the extremely rapid notes of a pied butcherbird

One way of understanding God's command to *sing a new song* is to sing a song *with excellence*, not necessarily a different melody (Psalm 33:3). Christ has assigned to each species of birds a sovereignly determined number of songs. Thus, birds cannot create a new song on their own. But what they can do is perfect the songs they sing. Young birds often mimic the notes produced by the adults using their own type of "baby talk." As they grow older, their songs become more complex until they sound like the adult hymns. It might take up to *six months of practice* before they can fully join their parents in praising God.

The chief way that birds achieve musical notes is through a unique organ located at the base of their trachea, known as the *syrinx*. We, on the other hand, originate song in our larynx (or voice box), which is located in our throat. So it could be said that we produce music from our throats, whereas birds sing from deep within their chests.

Christ Jesus created the syrinx with two sides, each acting independently of the other. Some birds, like the thrush, can thus create two harmonious notes at the same time. It is said that a bird's syrinx acts as a drum, a trumpet, or a flute depending upon the species. The English word syrinx, in fact, comes from the Greek word that literally means "twin or double flute."

Research has discovered that some birds can produce up to 80 sounds *per second*, but we hear them only as a single note. It's theorized that birds effectively live in a kind of "sped-up world." Christ's special design of a bird's ears and brain allows it to distinguish all these sounds individually, something which is impossible for us without special equipment.

GOSPEL FREEDOM

Our Lord Jesus made birds for freedom—freedom to fly. God made people for freedom—freedom to obey Him and richly enjoy His glory! A bird's freedom is found in the way Christ sweetly designed its body. A person's freedom is found in the Gospel, and in the Gospel alone (John 8:36).

It was for freedom that Christ set us free (Galatians 5:1).

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